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MEMOIR,

ENTITULED

DRAINAGE AND NAVIGATION BUT ONE UNITED WORK;

AND

AN OUTFALL TO DEEP WATER THE FIRST AND NECESSARY STEP TO IT;

ADDRESSED TO THE
CORPORATIONS of LYNN-REGIS
and BEDFORD LEVEL.

BY
T. POWNALL, ESQ. M.P.

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G.R III.
BRITISH MUSEUM

TO THE

MEMBERS

OF THE CORPORATIONS OF

Lynn-Regis *and* Bedford-Level.

GENTLEMEN,

AS the Drainage and Inland Navigation of thoſe counties which communicate with the river Ouſe, and the very valuable Maritime Navigation of the reſpectable town of Lynn, connected with the Outfall of that river, are likely ſoon to come under your conſideration; as there is every appearance and hope that the matter will come forward in good temper, and a right ſpirit of buſineſs: the following Memoir, drawn up from papers written in an early period of life, when leiſure led me to the ſtudy of theſe Subjects; and now confirmed from Experience in the Facts; is with great deference and reſpect offered to your peruſal.

It does not preſume to dictate—it means only to ſuggeſt obſervations, while it takes a general review of the ſubject—and it is dedicated to your ſervice, by,

Gentlemen,

Your moſt obedient

and moſt humble ſervant,

Richmond,
July 27, 1775.

T. POWNALL.

DRAINAGE AND NAVIGATION

BUT ONE UNITED WORK,

AND

An OUTFALL to deep Water the firſt and neceſſary Step to it.

SCIENCE without Experience, like ſounding braſs or a tinkling cymbal, may ſerve to ring changes upon one's own ideas with; but theſe ideas are ſeldom applicable to any real purpoſe of practical life. Such knowledge, when it attempts to mix with buſineſs, is generally found uſeleſs, and often hurtful; indeed where great expences are to be engaged in, and great riſks run, the conduct of the man of bare Science can ſcarce be neutral; if it is not advantageous, it muſt be hurtful, and may be ruinous.

On the other hand Experience without Science ſees things, like a man travelling through a country in a thick fog, darkly: he ſees the objects immediately about him, but ſees not their connections, ſees not the relation in which they ſtand, nor the proportion which they hold to other things, though but a few yards removed from him—he has neither ſcale nor level to mark his own ſituation by: he ſees the operations of things as they paſs under his eye; but knows not whence they come, nor whither they are going.

When the man of bare Science deſcends from theory, the moment that he ſets his foot on real ground he is in a wilderneſs without his compaſs. The moment that the man of bare Experience begins to reaſon he is loſt. The man of Science, while he ſpatiates in the upper regions of theory, deſpiſes that experience which is fixed to the ground: the man who picks up his knowledge in ſmall detail, upon the ſpot where he is uſed to take a lead, grows conceited of the little he does know, and preſumes to deſpiſe all that he does not know as groundleſs theory. The having been once right by mere inſtinct, makes him obſtinately convinced that he is always right, even when he preſumes to reaſon: and the meaſures which ſuited the particular caſe, which he ſaw without underſtanding, are, with him, to ſuit all caſes that look like it.

To ſpeak to the particular ſubject at preſent under our conſideration; the ſcientific engineer may be thoroughly founded in his mathematical principles; may have a perfect knowledge of the weight and motion of fluids; of the effect of their preſſure when lying as a dead weight; of their force when agitated by winds; of their action when flowing in currents and tides: he may have a perfect information of all the poſſible modes of reſiſtance to this weight, this force, this action; and yet through want of *actual knowledge* and acquaintance with all the facts, both ordinary and incidental; of the peculiar combination of facts, which form the ſpecific caſe to which his ſcience ſhould be applied—it becomes inapplicable, inefficient, or dangerous. A common country ditcher, who cuts only the ditch which he feels will drain; who raiſes only that bank which in the daily exertion of ſelf-defence he finds will ſtand,

and have reſiſtance; who carries down his waters, where he ſees they do go off, and do not recoil back upon him, is a much ſafer and more effective engineer, for a country, than the moſt ſcientific engineer *without local experience*: and yet ſhould this ditcher, with the preſumption of an emperic, undertake any general ſyſtem of drainage; the whole expence, the intereſt, the ſafety of the country is put at hazard, and the effect left to chance.

If then neither the engineer without local Experience; nor the man of Experience without Science can ſerve the public, but may be dangerous; what is to be done? Common ſenſe and good temper will anſwer this queſtion. The man of Science muſt not be vain of his barren theory: the man of Experience on the ſpot, muſt not be obſtinate in the purblind unlearned knowledge which he hath picked up. They muſt neither of them hold himſelf up too high in his own opinion, nor rank the other too low in eſtimation: they muſt each liſten with temper and patience to the other; they muſt give credit to each other for what each doth know; and be ready and willing to learn from the other, that which he does not and cannot know but what the other can teach him. The knowledge of the one is as valuable as that of the other; and both are in their degrees equally reſpectable. Mutual reſpect, where both are reſpectable, will bring them to compare their ideas together: they will find that both grow wiſer by mutual communication: good opinion will create a good underſtanding, and a true temper of buſineſs will ariſe out of it.

If this happy temper had once heretofore ariſen, and animated thoſe who took a lead in the great works of drainage and navigation; the great level would not have been at this day drowned lands; the country next the ſea would not have been as it is—a mere fragment or ruin of what it was: the navigation would not have been choaked up with thoſe ruins which have tumbled into it; or if they have in ſome meaſure been carried down, have been only carried down to form bars at the mouths of the rivers. But the hiſtory of this buſineſs informs us; that while thoſe who were concerned were ſtruggling for the lead, or for that power which was to give them a lead; the country hath been divided into parties—and when engineers have been called in, inſtead of aiding the experience of the country with reaſoning of Science; theſe men learned in figures have been, juſt as advocates learned in the laws are, brought forward to ſupport this or that ſcheme; not as truth led, but as the party who employed them called for an opinion. If the engineer comes forward in this light, he is of all men the moſt dangerous, and his opinion the moſt to be ſuſpected; the more plauſible it is, the more jealous ought the country gentlemen to be of it: but, if an * Engineer, a Gentleman and a Man of Honour, who has no intereſt in the buſineſs which can warp him; whom no party can ſway, and who is equally unconnected with all; who will accept no fee, or reward; who will not ſuffer even the idea of ſuch to be mentioned to him; is willing to lend the country his aſſiſtance in examining the caſe, and by giving that opinion which Truth and Science grounded on the caſe ſo examined juſtifies: a country ſo aſſiſted cannot but think themſelves happy, if they know their own happineſs.

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* N. B. This has reference to a gentleman, one of the beſt officers, and one of the moſt experienced engineers, in his Majeſty's ſervice.

Although nothing in the ordinary courſe of human affairs could have promiſed it; yet time and chance, which happen to all things, have at length (it is hoped) produced that temper in buſineſs, that public ſpirit, which will look to the intereſt of the whole, and to that of each part, only as it is a part of that whole. There ſeems to be a temper for mutual communication inſtead of croſſing altercation; a diſpoſition toward reciprocal aid, inſtead of retorted obſtruction.

In this ſpirit, and with this temper then, let us view the ſtate of things as they form the preſent caſe; let us examine the diſeaſe in its riſe, progreſs, and preſent habit; and try by Experience and Science united, the remedies which are, or may be propoſed.

In order to conduct our reaſoning or experience by thoſe rules of Science which will lead to practice, uſe, and real ſervice; we will with the man of Science previouſly offer to conſideration, ſome of the principles or laws of Nature, which operate in all caſes whatſoever.

The velocity of every run of water is greater or leſs, in direct proportion as it deſcends more or leſs in running a given diſtance; or, in other words, the velocity of all rivers are greater or leſs, as the ſlope of the bottom of the channel through which they flow is ſteep, or approaches to a level.

All rivers therefore, which run from an elevated country into a level or flat country, running ſlower through that level will always be found to deſcend into that plain faſter than they can be carried off.

While the ſame quantity of waters runs through a wider or a narrower channel, in a given time, they muſt run with leſs or greater velocity inverſly as is the capacity of the channel; or if, the channel remaining the ſame, a greater or leſs quantity of waters are run through it in a given time, the velocity will be directly as the quantity of waters paſſed: where therefore the circumſtances of a river or drain are ſuch, that a given quantity of waters are paſſed through them, the narrowing the channel to a certain degree, which will not raiſe the waters in that channel, muſt always encreaſe the velocity of the run, while widening it does ſlacken the current, and leave a dead preſſure on the banks, in proportion to the greater quantity of water retained and contained, within a given diſtance of ſuch river or drain.

Although the particles of earth are heavier than water, yet they are not ſo much heavier, but that when they are mixed with water, put into a certain degree of motion, they will continue ſuſpended in that water, ſo long as that particular degree of motion, which raiſed them, continues; but will ſubſide in proportion as that motion ſlackens, and more eſpecially where it ſtops.

All rivers coming from elevated countries, when either rains, or the melting of the ſnow, or the riſing of the ſprings encreaſe the magnitude and velocity of their current; ſo as to exceed, or at leaſt ſtrongly to preſs upon the channel of their ordinary courſe, will always wear away and carry off ſome of the earth or ſoil with them; and this always more in proportion as the country through which they run, is cleared of its woods or of its ſwath; and ſtill more in proportion to the ſiltry lightneſs, or mouldering conſiſtence of its ſoil. So long as the force and motion which took up this ſilt mud or mould continues, ſo long will the earthy particles be ſuſpended in, and carried down with the waters; but where that motion begins to ſlacken, and at every point where it is checked and ſtopped, there will the ſilt or mud begin to ſubſide and lodge.

The face of the earth in its natural ſtate, except in ſuch deſerts as are wholly without vegetation, is every where covered with woods. In this natural ſtate the multitude of little ſtreams are more numerous, the rivulets are more conſtantly ſupplied, and the rivers more uniformly abound with waters; the channels are ſettled, and ſuit more exactly the general run of waters; the floods do not waſh and wear ſo much; the earth is leſs liable to be worn, leſs of the ſoil of the upper lands is carried off, and the rivers are clearer, are leſs obſtructed in their channel, and ſeldom have bars at their mouths.

When ſuch a country firſt begins to be cleared of its woods for cultivation; when the ſoil begins to be turned with the ſpade and plough, and to be looſened; then firſt begin the great changes in the face of it; the leſſer ſtreams are exhaled and dried up, the rivulets become leſs in their ordinary run, and the diminiſhed waters of the rivers run within their former beds, like leſſer ſtreams winding within a valley. But although from the greater quantity of waters which are exhaled the rivulets and rivers are leſs in their ordinary run; yet as the ſnow, in this ſtate of the face of the country, melts more ſuddenly; as the rains run off more rapidly, the rivers become liable to floods, and with their floods carry down the mud of a looſened and broken ſoil. As long as the waters thus muddy continue deſcending with a degree of velocity down the ſides of the elevated country, the earthy particles, which are worn and waſhed off, are ſuſpended by the ſtream, and carried along with it: when deſcending hence the waters begin to flow along a more level country, they will begin to move ſlower, and in every progreſs of them ſtill more ſlow; the earthy particles upon the firſt abatement of their velocity will begin to ſubſide, but more and more as the velocity decreaſes in its advance along this level. The firſt effect of this will be, that the bottoms of the channels of theſe rivers will begin to riſe in this level country, but as the mud will be dropt more in proportion as the velocity of the rivers decreaſe, and as this decreaſe of velocity is gradually as the run is more and more diſtant from the high elevated country, ſo (all other circumſtances remaining the ſame) the bottoms of the rivers will be formed into an inclined plain, aſcending from the foot of the elevated country, in a direction contrary to the courſe of theſe waters; if the outfall of theſe waters lies in a ſandy bay, ſo placed as that the general courſe of the marine tides ſet into it, the influx of the tide ſo ſetting in, and running over looſe ſands, forming very muddy waters, will combine with this effect, and mix its ſands with the ſoil brought down by the rivers, and ſoon form banks in the rivers, or bars at their mouths. The next effect in the courſe of theſe operations of nature, is, that the rivers not finding their uſual outfall, at leaſt not ſuch a one as can iſſue their waters ſo faſt as they come down from the upland, they begin to wander about the edge of this elevated ridge, lying toward the ſea in new courſes and new channels in trial of an outfall. In theſe uncertain changeable wanderings with ſlow and doubtful courſe, they drop their mud on the land-ſide of this ridge; the ſea in the mean while, with its ſilty tides and the commotions of tempeſts rolling up the ſands againſt this elevated ſhore, combines in the effect; and the whole low country which was originally a gently inclined plane, becomes a concave, like a hollow diſh or bowl, between the raiſed ſea-mounds, in its front, and the foot of the elevated country at its back. In this ſtate of it, the bottoms of the channels of the rivers are ſoon raiſed above the level of the country, and the waters, which finding no outfall, fall back with refluent current into them; ſoon overflow their banks, and cover the whole face of the country, and a permanent drowning enſues.

From its having thus become a lake of ſtagnate waters, another change takes place in the drowned face of it. All the ſoil and mud which is brought from the upland country lodges here, and forms upon the once ſwathed ſurface of the land, now become the bottom of a lake, a muddy ſtratum. This vegetates with water-plants and weeds, which, as they grow, and as they die, add a new texture to it, and form what is called a Moor-Floor.

This account of this ſtate of the levels (confirmed by the hiſtory of it, without recurring to ſuppoſed effects of ſuppoſed earthquakes, and ſuch extraordinary cauſes) explains not only the progreſs, but the true cauſes of the diſeaſe; and the marking that cauſe, points to the true remedy. The accounts which ſuppoſe it to have come into this its preſent ſtate by ſome extraordinary cauſes, of which there is no proof that they did ever operate here, hath miſled the judgment in ſearch of extraordinary remedies which cannot operate.

A track of country in this ſtate, without any decided or ſufficient OUTFALL to carry off the waters,

ters, when collected and brought down, is an object which muſt baffle all attempts to drain it, while thoſe attempts go upon ſchemes which are confined within itſelf. The collecting the waters in high embarked channels, is only making a reſervoir of deſtruction; for, if they cannot be carried off, theſe waters muſt be conſtantly increaſed in theſe channels, till, by an immenſe ſoaking dead weight, they break down the banks (very ill calculated to reſiſt ſuch weight).—Enquire in the country about the fact, and you will find, that this breaking of the banks is a frequent, almoſt a regular, event, when the floods come down, and, not being carried off, lodge in the channels of the great loams and drains. Well, but mills ſhall pump the waters up from the bottom of this concave, to a height from whence they ſhall be run off. Let the mills then work, and ſee the effect: the particular track ſurrounded with banks, to which this pumping drainage is applied, may be pumped dry; but when one enquires, what becomes of the waters? one finds, that, from a certain height, they will indeed run off; but to that height they ſtand piled up on the out-ſide of the banks of this drained track, ready upon the firſt accident of any of the banks giving way, to fall back into it: and that accident pretty generally happens. But theſe inland engineers are not yet at the end of their devices. Having thus by mills pumped up the waters into embanked elevated drains, We will, ſay they and promiſe, from this height ſcour and *force an outfall*.—Follow then the waters in their ſcouring operation, and you will find, that, ſo long as they are, and can be, confined in their courſe, and a quick deſcent given to that courſe, there they will ſcour and ſcoop out a deep hole; but when and wherever they leave this confined courſe, or come to run towards the edge of the levels where that deſcent fails there; there, not only the ſcouring operation ceaſes, but all the ſoil which they brought down from the up-land, and all the mud and moor which they have ſcoured in their courſe through the levels, is laid and lodged to the increaſe of the diſeaſe. But, ſay theſe engineers, "We can force our way through this elevated "ridge on the edge of the levels, and we will "throw our waters into the rivers, where their "current muſt neceſſarily force and keep open an "outfall." View then theſe rivers, and aſk, what is become of the outfall of Wiſbeach river? Enquire whether this ſcheme of ſcouring an outfall could ſave Grimſby Haven? From Dugdale (p. 154.) you will learn, that, under this idea of ſcouring the channel, and forcing an outfall, the commiſſioners, who had juriſdiction there, exerted their authority in collecting all the waters which ran near to it, and having turned them all into the channel, thought they ſhould effectually open, and keep it open: they repeated this operation with ſtill more added waters; they increaſed the evil, and the haven has been loſt many years irrecoverably.

Wiſbeach old river went the ſame way to deſtruction. It is now fifty years paſt ſince the plain truth of its diſeaſe was told to the country; and a plain and ſure remedy propoſed to it by Mr. Kinderley. They never would believe the ſtate of their own caſe, and always diſregarded the remedy as a viſionary ſcheme of fine theory, not to be practiſed. The country has ſince lain in an almoſt continued ſtate of drowning and expence, and half ruined by quack projects, till at laſt they have been forced to give up the old river, and to lead their drainage down, and bring up their navigation in an entire new cut: a new cut, ſuch as would have been a permanent cure for ever, might have been made. Thoſe who wiſhed well to the country, wiſhed it. They have carried into execution all that the country would agree to; and they have got now a haven that anſwers well the purpoſes of navigation and drainage, which will *preſerve the country for a ſeries of years longer*, as Mr. Dunthorn tells them; and which is all that their honeſt engineers could or would promiſe them.

It is now hoped, that people, grown wiſer by ſeeing other folks errors and misfortunes, will believe, that, as ſure as the ſame effects muſt always follow the ſame cauſes, ſo ſurely is Lynn Haven verging faſt to the ſame fate. The harbour, at its mouth, is (in conſequence of the poſition in which it lies towards the main ocean) choaked with ſands; and the haven is ſeldom able for many years continuance, to keep the ſame channel and run to ſea. —As Wiſbeach river ran one while cloſe under the marſhes of Terrington, then ſhifted till it ran cloſe under the Lincolnſhire ſhore, on the contrary ſide of the bay: ſo have the waters of Lynn river, at its outfall from the haven, been ſhifting from ſide to ſide for a channel, as they could find it. There was at one time, an old eaſtern channel under Woolverton and Snetſham: there was another, a weſtern channel, under Marſh-land, on the oppoſite ſide of the harbour. In 1771, and the beginning of 1772, the waters ran in the old eaſtern channel: in the latter end of 1772, and in 1773, (as the pilots authenticated charts informed me) they forced a new channel in a direct northern courſe, through the Pinque way. The haven is at preſent, by this event, clear and open: but if the town of Lynn is ſatisfied, and reſts upon this *accidental relief*, and does nothing in aid of Nature, who has ſo kindly and ſo opportunely pointed out a remedy, their harbour and haven muſt, under the ſame ſymptoms, be loſt by the ſame diſeaſe as that of Wiſbeach was. Whatever the preſent flattering appearances may be, they being only *an effort in a diſeaſe*, the town of Lynn will, ſome years hence, have a new haven to cut, at an enormous expence. They ſhould, therefore, if either the demonſtrations of ſcience, or the convictions of experience can operate on them, join the offered connection of the country to undertake this buſineſs of drainage and navigation *as united in one general work*, under *one general direction*, and ſupported by *one general charge*.

In order to clear and lead the way to this, ſo neceſſary a truth, let us more particularly view the ſtate of the Ouſe, and examine the effect which the ſcouring (ſo much relied on) hath had; where the waters ceaſed to have the advantage of a quick deſcent, and began, as they approached towards Lynn, to feel the check which the want of an open outfall to deep water, muſt have upon their courſe. They continued with the force which they had already acquired, and with that by which they were impelled from behind to ſcour indeed, (not the bottom, ſo as to give a deſcent, and acquire an outfall) but they ſcoured away the ſides, they broke and carried away the banks, they wore the bed of the river into a wide baſon, and choaked it up with mud, to which the tides added their ſilt. The bottom of this baſon is now raiſed, even in the channel above the levels, further up the river: it is entangled with high ſands, amid which a crooked dangerous channel runs; the ebbs and freſhes running down from theſe ſands in their fall, and ſetting in directly with an almoſt irreſiſtible cutting force, from ſide to ſide, tear away the counter-ſhores, undermine the upper works of the banks, and tumble all into the river: the conſequence of this is, that the landholders loſe the benefit of their property, and, one after another, are ruined: the river is not kept up, and does, and muſt, every day grow worſe and worſe: drainage is almoſt at an end, and navigation obſtructed, is become difficult, expenſive, and dangerous, and muſt ſoon be loſt. The eye, caſt upon the map of the river, in theſe parts, will receive palpable demonſtration of the fact. The author of theſe papers, at the moment when he was examining the counter ſhores of the great bend below Tilney goal, juſt where the ebb ſets in directly, like the ſhot of a mill-ſluice againſt them, ſaw a barge or lighter that was coming down with it, in great danger; a tow-rope was made faſt to the maſt, and boy on one of the towing horſes, was fixed upon the ſand at the oppoſite elbow, to hold on at a dead pull, in order to bring the veſſel up in her courſe, ſo that ſhe might not run bump aſhore: ſuch, however, was the force of the current, that the horſe uſed to this work, could not, with all his force leaning to the draught, keep the veſſel from being ſhot directly againſt the counter ſhore with ſuch a ſtunt ſhock, that I expected to ſee the veſſel ſink: I was amazed that the maſt did not go overboard, or that the veſſel did not break her back; ſhe quivered for a moment, ſwung round with her ſtern; the horſe brought up her head to her courſe, and away ſhe went again at the mercy of the current. I ſaw afterwards another barge coming down in the like circumſtances; but the boatmen, actuated by the apprehenſions of the like accident, and directing the boy (who was ſet on the ſand in like manner, to haul up cloſe in time, before the lighter or barge got into the ſet of current) run the veſſel high and dry upon the ſand, loſt her paſſage, and was obliged to wait in no very ſafe ſituation, the next flood to get off, and the next ebb to proceed on her paſſage. If a perſon being, merely by chance, at this time on the banks of the river, ſhould have occaſion to ſee theſe two accidents in fine calm weather, within two or three days of each other, what muſt be the number of accidents at all ſeaſons, and at the worſt ſeaſons of the year? I have ſince been told, many ſuch miſchances do frequently happen. I ſaw alſo, after a hard blowing day, a fiſhing-boat lie a wreck upon the lower ſhores in this very place, by which a fiſherman had been drowned. Thoſe who know moſt of this river, know beſt how uncertain, how expenſive, and how dangerous the navigation of it is.

Thoſe who have ſeen, examined, (which this writer in a careful manner did) and noted down, how ſmall the quantity of freſh water, that iſſues through this part of the river at low water, is; and who knows, by taking the levels, how high the bottom of the river is in ſome places within this part, will find here amongſt other cauſes, one great cauſe of the defect of the drainings of the inland country.

Let the ſame view be carried to the examination of the haven at, and of the harbour below, Lynn; the ſame effects ariſing from like cauſes, will here be ſeen in ſtill ſtronger lines: when the ebb enters the harbour, on the eaſt ſide, at the upper part of Lynn, by Sandrigham Ea, it meets with a high-fixed ſand running out from the town ſide, far into the bed of the river: the obſtruction of this ſand, and the lateral operation of the waters iſſuing from the Fleet and from Sandringham Ea, caſt off the current, and ſet it round in almoſt a direct courſe againſt the ſhores and banks of Old or Weſt Lynn, with an impulſe and force that no banks, which the whole value of the lands could erect, can reſiſt. The whole income of theſe lands, in this wreck of a town, have been ſo often applied and loſt in effortleſs attempts of defence, that many of the landholders have given up the ſmall remains of that property which was left ſince the river, thus turned out of its courſe, hath taken away the beſt half of the town. The river muſt ſtill force its way more and more to the weſtward, and all the main body and ſouthward part of Lynn be deſerted by it, and not acceſſible, even for ſmall boats, but when the tide is in. The haven muſt every day grow more crooked, and, the currents thus loſing their force, the channel be liable every day more and more to ſilt up by unequal ſhallows following deep holes. Follow then the currents in their courſe as they ſhoot from hence, almoſt due eaſt, againſt the eaſtern banks of the haven below Lynn; there again they make the like havock; the tide alſo, with a long fetch, ſets in at its firſt entrance againſt theſe parts: all the mud and ſoil which the currents in theſe ravages tear away and carry off, together with that which, by their ſcouring, they are ſuppoſed to bring down hither into the harbour, will, as ſoon as their currents begin to ſpatiate and ſlacken in their courſe, all ſettle in the very chops of the harbour amongſt the ſands, and, mixing with them form bars, which nothing after can remove: many millions of cubic feet of ſuch mud and ſoil which have been carried off, are lodged; and ſuch bars as are the cauſe of the choaking up and the ſhifting of the channels in the harbour; and whether thoſe concerned will believe it or not, the cauſe is in operation which will deſtroy Lynn Haven.

Our obſervations have now brought us to the ſpot, where the whole evil and diſeaſe lies—*The defect of the outfall to ſea, that is, into deep water*, is the primary and efficient cauſe of all the miſchief, which the country experiences. Here lies the general diſeaſe, and until that is removed, all application to particular ſymptoms is only waſting the ſtrength, and throwing away the money of the country: the third acre is gone and ſpent; half the property, nay every acre, one after the other, may be given, and the value of the whole ſpent; the country will be ſtill left in a remedileſs ſtate of ruin. All inland pumping by mills, and piling up waters by banks, in order to ſcour, will only encreaſe the malady; as they draw off the waters from one place, they only pile them up in another; as they ſcour in one particular place, they only ſcoop out the ſoil to carry it and lodge it in another, where it will become more immoveable. If they could ſcour the whole level, they would but encreaſe its concavity, raiſing, at the ſame time, the high ridge at its edge to ſeaward; the waters muſt thus, as they always have done, fall back again; the whole level would become a deeper lake; and drainage, as it has done in fact, become by every operation of this kind, ſtill more and more difficult. *The attempt to force, by ſcouring, an outfall*, only tears the rivers to pieces, breaks down their banks, forms wide obſtructed lakes in them, and finally, could the ſoil be forced down to the mouth, would there form impenetrable bars of firm coheſive ſoil.

Since then this idea of ſcouring, this vain notion of *forcing an outfall* by ſuch ſcouring, is found by Science and Experience, by Reaſon and Fact, to be ineffectual and ruinous; we muſt ſeek, and if we can, find, where *a natural one offers itſelf*—from thence our operations ſhould derive; connected with that, and to that, all our works ſhould in their effect be brought. The firſt thing to be *there* done, is that of forming at the mouth of the Haven as it falls into the north channel, now open, ſome ſuch piers or banks, as may direct the current of the ebb directly into this north channel; ſuch as may receive alſo the whole in-draught of the tide, and direct its current right up into the Haven.

The ſloweſt, though perhaps the cheapeſt and the ſafeſt way of doing this, would be to commence from that part where the works of the haven leave off, and to run out by degrees, year after year, as the circumſtances of the ground and bottom on the ſands in the harbour will permit, and as the circumſtances of the tides lead, banks, which may keep the channel (as far as it ſhall be found neceſſary and practicable to extend them) in that preciſe breadth, which at the ſame time that it is ſufficient to receive the in-draught, may yet ſo confine the current of the ebb, as to retain its ſcouring force to the outfall. Having, by theſe meaſures, or by others which perhaps more knowing and more experienced engineers, than he who offers this, may deviſe and recommend, ſecured this point; then there is ſenſe, and will be effect, in a ſyſtem of ſcouring, and the reſt of the works will be found eaſy of operation. From the nature of the concave ſurface of the fen-country, as well as of marſh-land, the waters within the land drain back from the ſea towards the lower parts of this concave: the outfall from this inland country into the main river muſt be lower than this loweſt part, or the draining can have no perfect effect. The rivers, which come from the upland country, and paſs acroſs the fens, ſhould not be permitted to deſcend into theſe lower parts, but be held up in channels upon dykes, be conducted in one uniform inclined plain to the outfall. If theſe rivers are ſo conducted as not to overflow and add to the waters of the fens; and if then the waters of the fens ſhall be found manageable, ſo as to be drawn off from the lower parts of the concave by mills or any other engines, into the channels of theſe rivers; then the outfall at the high ridge, on the edge of the fens, need not be cut ſo low as otherwiſe it muſt be: the higher it can be ſuffered to be, ſo as to drain by the means here beforementioned, the better will be the deſcent into the main river, and from thence to the outfall at ſea: *this point muſt be particularly attended to*; for if from a partial reference had to the level of the fens only, the outfall from theſe fens be cut ſo low, as that although they are low enough to drain the fen from thence, there is not a due deſcent into the main river, and from thence to ſea—all drainage is at an end.

The rivers or other waters ſhould be collected into as few channels as poſſible, and ſhould be conducted in ſuch manner as to preſerve, as near as may be, an equal uniform flow of current: if the motion with which they flow is not uniform, in thoſe parts where it is ſwifteſt it will ſcour holes, or at leaſt a concave bottom; and alternately, where it becomes ſlower, throw up a bed of ſoil and mud. To avoid this evil, and to produce the effect deſired of an equal uniform current, in thoſe places where the deſcent is leſſened, the banks of the channel (inſtead of being at a greater diſtance) ſhould be brought nearer together, and the channel ſtreightened, in order to encreaſe that velocity which the current would otherwiſe loſe by the decreaſe of the deſcent: the falſe idea of ſetting them in ſuch places at a greater diſtance, in order to give ſpace for containing the ſurplus of waters, which are brought down faſter than they can be iſſued, increaſes the difficulty; for the width of the channel would ſtill more decreaſe the velocity of the current, and of courſe encreaſe the ſurplus not iſſued: on the contrary, where the plane inclines with a greater deſcent, there the banks ought to be in proportion at a greater diſtance, in order that, by giving ſcope to the waters to ſpread, the velocity of the current may be in that proportion ſlackened; as the capacity of all channels muſt be in proportion to the quantity of waters to be iſſued, a particular caution muſt be carefully attended to in the narrowing, that the channel is not made too narrow to carry off the accumulated floods, or to receive the higheſt tides. On the other hand, care muſt be taken that the channel is neither made, nor ſuffered to become too broad, ſo as to give a ſcope to a ſecondary interior winding channel within the main bed, thus become too wide to be covered in the general courſe of the ſtream; for wherever that is the caſe, the current will ſet from ſide to ſide, as the plains of the banks ſhoot them down their ſides, and the banks, as before deſcribed, will be in conſtant danger of being undermined. Science can preſcribe no rules for this widening or narrowing the channel which can be depended upon—Experience alone can find thoſe out, and Experience beſt will find them out.

All tide-rivers, and all rivers through which temporary floods of the ſeaſons run, muſt neceſſarily have, as they all have, an interior narrow channel within the main bed. This interior channel is in the beſt and moſt perfect ſtate, when it runs ſtrait in the middle of the main bed of the river. To avoid any obſtruction of the ſtream, by a crooked and ſo continually checked motion; to avoid the forming of ſands and ſhoals; and to prevent the currents, running from ſide to ſide, from undermining the main banks; the interior channel ſhould, by every means that are practicable, be kept in the middle of the main river: in the firſt place, it is a ſure ſymptom that the main river is defective, or too wide, wherever this interior channel begins to form itſelf into a crooked courſe: narrowing the main river in ſuch caſes is the true and effectual remedy; but ſurely, even without that, there are meaſures, which taken in time, might keep the interior channel ſtrait; a ſingle boatman, aſſigned to a given diſtrict, conſtantly watching on the river or drain within that diſtrict, with ſuch a boat and ſuch a ſcoop as is uſed in the upper parts of the river Thames for drawing ſand, and wherever he perceives any ſand riſing, ſo as to give a curve to the ſtream, there in the inſtant removing that ſand at its firſt begining, would eaſily, I ſhould hope, keep the river in good order. In the haven, at and below Lynn, and in the commencement of the harbour, (as the work would be heavier) ſuch improved machines, as are now uſed in the lower parts of the river Thames for raiſing ballaſt, might be applied in the like preventive operations. This conſtant redreſſing of

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the interior channel, if it could not, as in ſome places it could not, keep the interior channel always in the middle of the main bed of the river, would yet keep it from getting ſo very crooked, as to occaſion the evils above deſcribed.

The ſides of this interior channel or lower ſhores ſhould alſo be particularly attended to, as they are always liable to wear away, if the front or faces of them are not guarded againſt this effect; as they wear, the channel will be widened, and the bottom of it raiſed in proportion; if from original bad formation, or from neglect, this interior channel runs under the ſhores of the main bed, and if they are permitted to wear, as in ſuch poſition they are ſtill more liable to it, then the main banks will be always in conſtant danger of being undermined; they will in fact be undermined and tumble into the river. The firſt care therefore muſt be had to theſe lower ſhores of the interior channel; but the keeping the interior channel ſtrait and in the middle of the main bed, where that can be done, will always be the ſureſt meaſure, and the leaſt expence.

We will firſt examine the method practiſed by the landholders, who live on the rivers in marſhland. In order to defend the faces of the lower ſhores of theſe interior channels, they fix an upright ſtack of faggots in the front: as a counter ſhore, wherever this covers them, and ſo long as it ſtands, it does effectually guard theſe faces; but ſtanding perpendicular, and thus throwing the whole preſſure from the heighth of the water on the bottom at the foot of this counter-ſhore, the current always cuts and wears there more in proportion to this *perpendicular* height; the bottom on which this ſtack of faggots, this counter-ſhore, ſhould be founded, is worn away; the whole ſtack is continually ſinking, and muſt be as conſtantly repaired by heightenings at the top, but will anſwer for a certain time only; for as it ſinks out of its perpendicular, and as it projects againſt the ſet of the current, the ſtacks, after having continued ſinking for ſome time, do moſtly go over and away all at once, and tear away with them more of the ſhore than the currents would have worn off: when theſe are to be replaced, if the ſides of theſe lower ſhores are ſteep, ledges are to be cut in them, and ſo again and again, the ſhores are repeatedly cut away in as great a degree as perhaps they would have been worn.

The *expence* of this method of defence, uſed at the lower ſhores under water, deſerves alſo a ſerious attention. Although when this might firſt have been uſed, (the woods being more plenty and nearer at hand) it might not have been very expenſive; yet now, in the preſent cleared ſtate of the country, the expence becomes a very material objection to it; it is heavy and it is conſtant, for even where theſe counter-ſhores have the luck to ſtand, it cannot be very long before they want repair, from the woods rotting, and then again they go.

The firſt, eaſieſt, leaſt expenſive, and moſt effectual meaſure would be, ſo to redreſs the interior channel, as to keep it, as near as may be, in the middle of the main channel, as it is in all new made cuts: but that this may be practical, it muſt be a general meaſure under a general direction; for if left to private work, adjoiſted to partial limited diſtricts, it will frequently ſo happen that *the cauſe*, which turns the interior current out of its ſtrait courſe, and which cauſe muſt be removed before that channel can be redreſſed and kept in a ſtrait line, does not lie within the allotted work, which the perſon is to do where *the effect* of a crooked channel takes place: But done as a common work under a general direction, when, by cutting the ſands, a ſtrait channel is once opened, it may, not at any very great expence, but by conſtant attention to it, be kept ſtrait.

If this meaſure ſhould not be thought feaſible and proper; and if there are parts in the river and harbour where it could not be applied: and if the ſtream muſt, or for reaſons in buſineſs which cannot be got over, will ſtill be permitted here and there to run cloſe under the ſhores of the main channel; then ſome other method than the preſent of forming upright counter-ſhores, made with ſtacks of faggots advanced againſt the ſtream, muſt be thought of and attempted; which may ſo defend the faces or front of theſe lower ſhores, as not to give a ſharper bite and more cutting power to the currents at the bottom under them, than, by another form of bank and another face of defence, they would have.

Every man of Science, every Engineer, nay common ſenſe will ſee, that the more theſe defenſive counter-ſhores approach to a perpendicular, the greater weight and the greater force of cutting muſt the ſtream have at the bottom of this perpendicular; and as the ſtream from the oppoſite ſide is ſhot down an inclined plain, the direction of this cutting power muſt be rather *lateral and undermining:* the only meaſure, in the firſt place, to take off part of the weight ariſing from the perpendicular height, is, by *ſloping the ſide of this lower ſhore*, ſo as to make each part of the ſhore bear its proportion of the weight thus proportionably diſtributed, and not leaving the whole weight to bear on one point at the bottom; alſo, by making this ſhore an inclined plain, it will counteract in part the lateral undermining direction. When the face or front is once cut into this form, the next and neceſſary care is to keep and preſerve it in that ſtate, *by defending the face from wearing*. It is known that no ſoil is liable to be worn by the floods ſo long as it can maintain its ſwoad or ſwath; this is *a natural ſheath* to it; where that cannot be (as in theſe ſhores under water), *an artificial ſheathing* muſt be applied: reeds and ſedge do in ſome rivers become the ſheathing to the banks where they grow; where that cannot be, Common ſenſe, doing the next beſt thing to that which Nature is prevented from doing, would try to fix upon the face and ſurface of theſe ſide-banks (formed, as above-directed, into a ſlope) *ſome ſheathing of reeds or ſedge by ſome artificial means*; for whereever ſuch can be ſo fixed, as to abide, there the banks can never waſh away; although when fixed they cannot be expected to abide, without attention to the keeping them in repair; yet with ſuch repair, eſpecially at the bottom, (done at much leſs expence than any other mode of defence) the banks may be preſerved from wear. The Writer of this memoir is making an experiment of this meaſure. Upon enquiring into the courſe and hiſtory of the faggot-banking, and upon making a minute examination of the nature of that ſpecies of defence, he had occaſion to ſee, and even to feel, That, in the firſt place, it was uſing, at a ruinous expence, materials not found in the country, but bought and brought from a diſtance at great prices: that the very nature of making theſe faggot-banks led to unavoidable frauds; becauſe it before that channel can be redreſſed and kept in a ſtrait line, does not lie within the allotted work, which the perſon is to do where *the effect* of a crooked channel takes place: But done as a common work under a general direction, when, by cutting the ſands, a ſtrait channel is once opened, it may, not at any very great expence, but by conſtant attention to it, be kept ſtrait.

If this meaſure ſhould not be thought feaſible and proper; and if there are parts in the river and harbour where it could not be applied: and if the ſtream muſt, or for reaſons in buſineſs which cannot be got over, will ſtill be permitted here and there to run cloſe under the ſhores of the main channel; then ſome other method than the preſent of forming upright counter-ſhores, made with ſtacks of faggots advanced againſt the ſtream, muſt be thought of and attempted; which may ſo defend the faces or front of theſe lower ſhores, as not to give a ſharper bite and more cutting power to the currents at the bottom under them, than, by another form of bank and another face of defence, they would have.

Every man of Science, every Engineer, nay common ſenſe will ſee, that the more theſe defenſive counter-ſhores approach to a perpendicular, the greater weight and the greater force of cutting muſt the ſtream have at the bottom of this perpendicular; and as the ſtream from the oppoſite ſide is ſhot down an inclined plain, the direction of this cutting power muſt be rather *lateral and undermining:* the only meaſure, in the firſt place, to take off part of the weight ariſing from the perpendicular height, is, by *ſloping the ſide of this lower ſhore*, ſo as to make each part of the ſhore bear its proportion of the weight thus proportionably diſtributed, and not leaving the whole weight to bear on one point at the bottom; alſo, by making this ſhore an inclined plain, it will counteract in part the lateral undermining direction. When the face or front is once cut into this form, the next and neceſſary care is to keep and preſerve it in that ſtate, *by defending the face from wearing*. It is known that no ſoil is liable to be worn by the floods ſo long as it can maintain its ſwoad or ſwath; this is *a natural ſheath* to it; where that cannot be (as in theſe ſhores under water), *an artificial ſheathing* muſt be applied: reeds and ſedge do in ſome rivers become the ſheathing to the banks where they grow; where that cannot be, Common ſenſe, doing the next beſt thing to that which Nature is prevented from doing, would try to fix upon the face and ſurface of theſe ſide-banks (formed, as above-directed, into a ſlope) *ſome ſheathing of reeds or ſedge by ſome artificial means*; for whereever ſuch can be ſo fixed, as to abide, there the banks can never waſh away; although when fixed they cannot be expected to abide, without attention to the keeping them in repair; yet with ſuch repair, eſpecially at the bottom, (done at much leſs expence than any other mode of defence) the banks may be preſerved from wear. The Writer of this memoir is making an experiment of this meaſure. Upon enquiring into the courſe and hiſtory of the faggot-banking, and upon making a minute examination of the nature of that ſpecies of defence, he had occaſion to ſee, and even to feel, That, in the firſt place, it was uſing, at a ruinous expence, materials not found in the country, but bought and brought from a diſtance at great prices: that the very nature of making theſe faggot-banks led to unavoidable frauds; becauſe it became the intereſt of every one concerned to unite in cheating the landholder. The leſſer the faggots were the more muſt be bought, the leſſer they were the more muſt be laid, and they are laid by the hundred; the looſer and worſe made they are, the more the ſeller gets by them, and the ſooner they are broken up and want repairing again.

He found alſo, that in order to lay this ſhort-lived defence, which never ſtood long, it became neceſſary to cut away the clay ſo much from other banks, that might have ſtood for ever, that *they* now in *their* turn begin to wear away. He turned his eye to enquire what materials the country itſelf would afford; and found that reeds and ſedge, which Nature herſelf pointed out as good defences (where they could be applied) were to be had upon the ſpot. It remained only therefore to try if any method could be found of fixing theſe on the faces of the interior lower ſhores. The Dutch in ſome places make a kind of matting, and pin that down; in other places they affix a ſpecies of watling, made of oſiers. He would, if he could, have got ſuch matting, and will, whenever he can, get ſuch, fix this on the faces of the banks, by covering them with flakes or hurdles, or other cheaper watling, and pinning them down; in the mean while, uſing what he could get, he tied reeds to hurdles, and ſtaked theſe down on the faces. His firſt trial (for reaſons which need no explaining) were very unfaithfully and very imperfectly made; the perſon entruſted did not drive the hurdles down cloſe, ſo that the reed ſoon waſhed from under them. His ſecond trial ſucceeded better, the hurdles lie firm, but not having been carried to the bottom, the ſoil has been waſhed from beneath them; where, however, they do lie, they not only defend the face, but are themſelves, when they lie well, on a ſmall ſlope, covered with ſilt: the people of the country allow that they will do in this ſituation, and begin to follow the example. But it has been objected that they will not do where the ſlope is ſteep. The firſt anſwer to this objection is, by marking that hurdles ſtaked againſt a ſteep ſlope are more likely to remain, than a ſtack of faggots ſet right on ſuch a ſlope. However, being aware that this ſituation was attended with more difficulty, and that, if the hurdling with theſe reeds or ſedge annexed to them did not go quite to the bottom of the river, the banks would be ſtill undermined; he made at a ſeaſon of very low water, a very particular examination of the counter-ſhores, where they were moſt ſteep, and of the manner in which the faggots were laid upon them: he ſaw the banks cut into ledges, on which rows of theſe faggots were laid for a foundation of the ſtack piled up above; and he ſaw the ſtream cutting under them ſo, that the points of the faggots hung over; he ſaw ſeveral of theſe faggot-banks hanging over the ſtream, like a ruin ready to tumble in; and ſaw in places where they had tumbled in, that the bank had been cut away for the purpoſe of laying them originally, more than it would have been worn in many years. He ſaw that the ſlope was no where ſuch but that this ſpecies of hurdling, which he wiſhed to try, might be eaſily and firmly affixed. In order to begin that covering from the very bottom, he contrived a punch with a cap to go over the tops of the ſtakes, by which the ſtakes, which were to pin down the hurdles, might be driven at five or ſix feet under water. This ſpecies

cies of defence of the counter-ſhore has never yet before been tried; but he is determined to make the experiment; the riſque and the expence are his own: if it ſucceeds, he hopes his neighbours will profit by it as well as himſelf. Other and better ways of defence againſt the water wearing away the lower ſhores or ſides of the interior channel may perhaps be contrived: in a caſe, which calls ſo much for remedy, and in which ſuch bad and deſtructive meaſures have been taken, every thing ſhould be tried; for unleſs the interior ſtream is kept from running cloſe under the upper banks of the main channel; or if they are ſtill ſuffered ſo to run through neglect of redreſſing the main channel, and ſome other ſpecies of defence is not applied when a real ſyſtem of ſcouring takes place, the expence of theſe faggot-ſhores muſt diſable, and the inefficiency ruin, the landholder: while in the end the river itſelf, the drainage and navigation, will be loſt. Thus much of the interior channel, and its ſides and counter-ſhores.

Whoever views the main channel of the Ouſe, after all the waters of the level are collected in it, from St. Germains to Lynn, and examines all which will be neceſſary in cutting the channel and embanking the ſides: whoever, with the eye of Experience led by Science, looks to the conſequence and effect, will find reaſon, from the enormous expence, with the little hopes of any permanent good to be expected by any thing done in the old, now almoſt impracticable channel, to determine to quit it, and to endeavour to obtain a new ſtrait cut from St. Peter's, or at leaſt from Eabrink to the mouth of Sandringham-Ea, juſt above Lynn-Regis.

Any attempt to redreſs the interior crooked channel, winding through the wide-worn baſin of the ruined river, between Knights-Gole and Lynn; any attempt to cut, and to keep open when cut, a ſtrait channel through the looſe ſands of that baſin, muſt be undertaken at an enormous expence, to try a very doubtful experiment, or rather, to ſpeak out, one which undoubtedly will fail. What engineer will undertake to fix banks amidſt theſe ſands? And if the currents are permitted to run from ſide to ſide, boring and undermining, as it does, the main banks; What engineer, at any practicable expence, will undertake to preſerve the river from growing every day worſe? What engineer, at any practicable expence, will undertake to defend and preſerve the country? The country will be firſt ruined with effortleſs expences, and finally overwhelmed; the drainage will be obſtructed and finally loſt; the navigation, growing every day more uncertain, expenſive and dangerous, will finally be choaked up; and whatever reception this repreſentation of events may have with the town of Lynn-Regis, it will moſt aſſuredly find, that as theſe things come forward into event, the ſea will retire from the haven, and the harbour become a waſh. I could demonſtrate this, not by reaſoning which will not be believed, but by facts now exiſting in the hiſtory of many rivers and ports in many different parts of the world; which, though once great maritime ſituations, are now dry within a vale, to which the ſea never comes.

The quitting the old river in this crooked, ruined, irrecoverable part of it, is become at laſt a matter of neceſſity; and the cutting a ſtrait cut is the only meaſure left, by which to carry on a real drainage; by which to maintain for any great time longer, a practical communication of navigation between Lynn and the inland country, by which to preſerve for ever Lynn itſelf as a great maritime town.

So far as ſuch a cut is a new ſewer through which the inland country is to be drained, ſo far (by the very principles and laws of ſewers) ſhould all who drain pay in proportion to it.

So far as it is a navigation, ſo far ſhould all who navigate, or are ſupplied through it, pay a certain tonnage. And thoſe landholders, who now are at conſiderable private charge to maintain their banks and defend their land, but who by this change of the courſe of the river will ceaſe to have banks, ſhould, nevertheleſs, in proportion as they are relieved from that charge, ſtill pay a certain proportion in a general charge, to the making this cut.

Theſe rules of juſtice fairly, and with good faith, attended to; and the uſual rules obſerved, as to the paying for, or the exchanging, lands cut and covered; one ſhould hope, even the country gentlemen, through whoſe lands the cut muſt go, could have no objection to it; eſpecially, if care, in any new act of parliament, is taken to put the towing track and boatmen under thoſe regulations which are at preſent ſo much wanted. The corporation of Lynn (ſpeaking of its landed intereſt) muſt find its intereſt greatly advanced by it, as it would avoid thereby a very heavy expence, which it is now charged with, from the preſent ſituation and circumſtances of the banks of its eſtate.

A dam muſt be made acroſs the old river, where this new cut begins, that the whole of the current may be turned, and paſs through it. Its capacity, both in the interior and main channel, and the ſtrength of its banks, muſt depend upon what experience,

rience ſhall have ſhown, and can demonſtrate with ſcience, to be neceſſary for the currents which are to paſs through it: and being ſo made and ſo ſecured, no ſlakers ought to be made from it; for the taking away part of the waters which form the current, will not diminiſh the height of the waters in the channel, but will ſlacken the current, whoſe velocity ſhould ſcour.

Such a dam being made, for inſtance, above Knights Goal; which may be eaſily made; let us conſider the effects which will follow:—the preſent bed of the old river, and wide baſon above Lynn, will receive, and become a ſort of reſervoir to contain, a large quantity of the tide-waters; at the ebb, theſe waters will be regorged with a ſharp and ſcouring current into the haven, and there will operate, while it laſts, as a ſcouring power, which ſome engineers, in other ſituations, have incurred great expences to procure by art. Let this, therefore, operate while it may; but (ſpeaking the truth) we muſt apprize thoſe who are to conſider theſe matters, that this operation will not laſt many years; for, the tide, ceaſing to run in this channel (now dammed up), long before it ceaſes to riſe, will begin to drop its ſilt; and, as the ebb retires without being followed by any run of back-water to ſcour after it, will ſpread that ſilt over the preſent ſands, and even in the channel, in a thin courſe, which, by ſlow and almoſt imperceptible degrees, will ſurely ſilt this quite up, except, perhaps, ſome little channel which the run of the goles may keep open: but the chances are a thouſand to one that the goles themſelves are ſilted up alſo. Wherever there havebeen ſuch reſervoirs, (as, for inſtance, on the Spalding river) they have always ſilted up; and wherever goles have been in the ſituation that theſe of Knight's, Iſlington, and Clenchwarton goles will be, they have generally been ſilted up. Any reaſons, therefore, which are for keeping this whole deſerted channel open, ſo far as they go upon the idea of a reſervoir, are but for a time, and ſo far as they reſpect the ſtate in which the goles may be put by leaving it open, or by ſhutting it up, are pretty nearly equal on both ſides.

The landholders, who lie upon the banks, although, by its being left open, they muſt ſtill continue, for a time, under a heavy charge for their banks, which they are at preſent loaded with, will, in the end, find their benefit by the accretion of ſoil which ſuch a tide dammed up, muſt bring and leave. Thoſe who write only to one ſide of a queſtion, bring forward and ſtate thoſe reaſons only which are meant to ſupport the opinion that they have taken up. Thoſe who wiſh to ſtate a ſubject for conſideration of what may be beſt upon the whole, ought (as I mean to do) to ſtate every reaſon, on every ſide, where a queſtion, or even a doubt, may ariſe. On the queſtion, therefore, or doubt, which different opinions may give riſe to, on the two points, namely, Whether it were beſt or no to finiſh the new cut with a ſluice? Whether it were beſt or no to run a damm acroſs the old deſerted channel at the lower end, as well as at the upper end of the new cut? I ſhall endeavour to ſtate the different opinions, and the reaſons for them, with equal candour to both ſides, whatever my own opinion may be, which I ſhall alſo give without diſguiſe or reſerve. And, taking up this firſt queſtion in that ſpirit, I ſhall not heſitate to ſay, that, from thoſe principles by which I have learnt to reaſon in theſe matters, I ſhould not conſider it as a queſtion, or even bearing a doubt, that the mouth of the new cut ought to be open and free to receive the indraught of the tide; and to be, in every reſpect, as a natural river is: But as there are ſome practical engineers who are very much of opinion for finiſhing theſe new rivers that drain into tide-rivers and harbours with ſluices, it comes neceſſarily within the ſcope of theſe conſiderations to ſtate and to examine the reaſons on both ſides, as they are brought in ſupport of the different opinions, on this matter.

We found it to be a fact in the operations of Nature, That the particles of ſoil or ſilt, which were raiſed and mixed with the water of the freſh currents, or with the tides, would continue ſuſpended while the motion that raiſed them continued in action; and would begin then firſt to ſubſide, as that motion ſlackened, and would lodge where that motion entirely ceaſed.

A ſecond propoſition is equally true, and ſhould be attended to as a principle in theſe matters; namely, That as ſalt water is heavier than freſh water, that quantity of ſilt, which would continue ſuſpended in ſalt water, will, as that water begins to mix with the freſh, the ſooner begin to ſubſide.

Theſe principles are undoubtedly true; yet, taken ſimply, without conſidering at the ſame time the combination of other powers in the ſame operation, they have miſled ſome very ingenious engineers to the idea of not admitting the indraught of the tide; becauſe, ſay they, the ſalt waters of the tides coming in loaded with ſand and ſilt, will, as they mix with the land waters, as they begin to ſlacken in their motion, and are, at the turn for a while, ſuſpended from all motion, begin to drop their ſilt in the channels of the rivers where they are thus indrawn, will lodge it, and, forming banks, choak up thoſe channels. The fact is true, that where the tide comes in over a ſandy bay, barred alſo with ſands, it will always come in muddy. It is alſo true, that rivers which run into ſuch a bay, *where they have no clear outfall* into deep water, will be checked at their outfall, and, the waters not iſſuing ſo faſt as they are brought down, will be full of ſands and obſtructions. All attempts of ſcouring ſuch rivers will only wear deep holes in thoſe partial places where the ſcouring operates, but that ſcouring, for want of an outfall to deep water, not being general, the operation muſt, of courſe, raiſe high grounds in other parts. The effect of the tides admitted into ſuch a river, is but a ſecondary and conſequential cauſe of the original defect; the defect in the outfall is the efficient and material cauſe.

But let us enquire whether the ſame effect, in a greater degree, will not follow, from entirely ſtopping current of the freſh waters, penned up by a ſluice, during the flow of the tide, and from ſtopping the tide itſelf ſhort at ſuch a ſluice.

The freſhes, wherever ſtopt for two or three hours, will not only drop their mud and ſoil, but will have time to ſettle and lodge in that mud and ſoil, and the tide, where ſtopt ſhort in its courſe, muſt there drop its ſilt: if ſo, the bottom of the channel muſt be gradually raiſed with ſoil on the inſide of the ſluice; and banks of ſand and ſilt will lodge at the tail of it, on the out-ſide. But, (ſay theſe engineers) " Although this might be the caſe, and is indeed frequently the caſe at the ſluices of cuts, which are only drains, and do not always run; yet, this never could happen at the ſluices of rivers, eſpecially of ſuch a river as the Ouſe, which runs with a great ſtream, and often with very great torrents of the floods and freſhes which come down it; becauſe, when the waters of the river, which have been penned and piled up, once begin to run at the fall of the tide, they will go off with a flaſh, and ruſh with an accumulated force, which, at the firſt ſtroke, looſen and raiſe; and, in their increaſed velocity, will carry off all the ſilt or ſoil that lodged in the intermediate time."

But, on the other hand, are not the waters in tide-rivers piled up by the refluent current of the tide? Is there not this advantageous difference alſo, that, although they are thus raiſed, yet they are not ſtopt in their courſe, but run up with a boring ſcouring current, that operates in the mean while? and when the tide returns, by an ebb, which runs down with a *velocity* greater than the ordinary courſe of the current of the river; will not the waters, thus raiſed, run in like manner with an increaſed *velocity* and with an accumulated force, acting, not on ſilt, ſoil, and ſand, which have had time to ſettle and lodge, but on ſilt, ſoil, and ſand, yet in great meaſure ſuſpended by the continuance of the motion? In tide-rivers, which have their natural courſe, the water is always in motion, running either up or down; and ſo far as, by its being in motion, it is more able to keep ſuſpended, and leſs liable to drop the earthy particles mixed with it; ſo far is its being thus left at liberty better than a ſtoppage either of the freſhes or of the tide; which, thus robbed of their motion, are leſs able to ſuſpend, and more liable to drop, theſe particles, above and below the point where this ſtop operates. Again, on the ſuppoſition that the ſluice collecting the ſcouring force to a point, does there ſcour more than the current in its ordinary courſe would do: let us examine what the effect of this partial pointed ſcouring is? Where it acts, ruſhing out of a ſluice, it will there ſcour a deep hole, and throw up the earth which it ſcoops out of this hole, together with the ſoil which the waters brought down with them, in a high bank, ſpreading in a circular line, round this hole. But thoſe, who are ſo much intereſted in the conſequences and effects of theſe operations, ſhould not truſt to theſe reaſonings about them: they are not in this memoir offered to them with that intent, but rather to ſuggeſt a line of enquiry as to the facts themſelves. Let them enquire after the circumſtances, operation, and effects of the great ſluice at the upper end or entrance of Boſton haven: let them look to the effect of flaſhes on the river Thames; on which, until within this year or two, there were nothing but flaſh-locks; and they will find in the bed of its channel, amidſt theſe flaſh-locks, an alternate ſucceſſion of holes and high ſands.

If there be reaſon to expect that this ſcouring through a ſluice into a tide-haven, will have the effect of ſcouring a deep hole at the tail of the ſluice, the danger which may accrue, in conſequence of this operation, ſhould be carefully attended to and guarded againſt; I mean, the danger under ſuch circumſtances, and in ſuch a ſituation, of the ſluice blowing up.

Upon the whole of this matter; If there is no more damage incurred by admitting the indraught of the tide, than what is equally, nay, more likely to be incurred by the ſtoppage of a ſluice: if no benefit can be derived from the operations of ſuch a ſluice, but what in a ſurer and more beneficial way will be derived from the operations of the tide and freſh waters continuing to ſcour both up and down with an inceſſant motion: if the advantages and diſadvantages were equal on all ſides, the difficulty of erecting and keeping up ſuch a ſluice in ſuch a ſituation; the enormous expence of it will always act as ſufficient reaſons againſt the meaſure of building ſuch. Thoſe who underſtand thoſe matters; who ſee the inutility, and have good and well grounded reaſons from experience to foreſee the danger of it, will certainly, if they or any of their friends have no intereſt in the building of it, decide againſt it.

The mouth then of the new cut being left open to receive at full liberty the indraught of the tide, it muſt not only be made (as before remarked) of capacity ſufficient with banks ſufficiently ſtrong to contain and paſs the ordinary ſtream of the floods and freſhes, but to receive and hold up the largeſt probable tides alſo.

The next conſideration which naturally offers itſelf, is, Whether it were better (by running a damm acroſs the old forſaken channel at the lower end, as well as at the upper) to turn the whole tide up the new cut; or whether, leaving the old channel alſo open, it were not better to ſuffer part of the tide to run up into the great wide baſin above-mentioned, to be there collected as a reſervoir of water, which, at the turn of the tide, diſgorging itſelf, may run down after the ebb? In one view, it ſhould be conſidered, that ſo far as the bore of the tide performs part of the operation of ſcouring, ſo far does the taking away any part of the tide's current (in like manner as the taking away by ſtakers any part of the freſh water current) abate and leſſen that effect. However, if no defect is likely to ariſe from the thus dividing the tide, ſome good may ariſe from the ſcouring being carried on more gradually by theſe means, than when it is done in a more violent and haſty manner, conducted in a pointed courſe, through one narrow channel only. The obſervation which I mean here to ſuggeſt, is taken from the reaſoning and experience of an able engineer in Holland: his doctrine, as contained in a memoir on the ſubject of redreſſing the channels of the rivers in Holland, is, That, as the obſtructions have been formed in a ſeries of time, it will always be beſt and ſafeſt, that they ſhould be in the like manner gradually removed: any attempt, by ſcouring, to looſen and raiſe the ſands, may operate to the looſening and raiſing, but no waters can carry them off all at once: they will therefore only be removed at a greater diſtance from the force that operates upon them, and there lodge, out of all feeling of the effect of its power, and become, for that reaſon, fixt and immoveable. Whereas, on the other hand, a gradual operation of ſcouring, that raiſes no more at a time than it can carry off, will carry it away to deep water. Whether the ſuffering the tide to be divided, part going up the new cut, and part up the old channel; and whether its ſo returning, leſs conſtrained, in two, than in one direct channel, is not more likely to effectuate this *gradual ſcouring*, is well worth the conſideration of thoſe engineers, whom the country and town of Lynn may conſult.

There are thoſe, who think that a dam ſhould be run from the weſt lower point of the new cut, acroſs the lower end of the forſaken channel, to the weſt bank of the haven, in ſuch manner as to continue, as near as may be, the courſe of the new cut in an uniform direction into the haven, and ſo to join it thereto, as to make one uninterrupted work: they conceive, that, if there be no ſuch damn, the waters will, in the moment, and at the point that they quit the conſtraint of the new cut, ſpread, be diverted, and loſe their force; and that part of the ſtream may perhaps, at the latter end of the ebb, run back into the old channel. But, for my own opinion, I think, that if the works proper to be done, in the haven are done, as they ought to be, no ſuch damm will be neceſſary at the firſt; and that if ſuch become neceſſary, it will be hereafter much eaſier done, Should not Nature in the mean time do it of herſelf: I think it to be certain ſhe will; for by the whole old channel ſilting up, a natural damm will be formed.

We are now, in the order of writing, come to the conſideration of that object; which, in its importance, and as the only foundation whereon the whole can reſt and be eſtabliſhed, ſhould be firſt conſidered, and firſt begun upon in execution. Being here treated of laſt, we may hope, will give a laſting impreſſion on the minds of thoſe who are to determine on it.

We ſhall commence this conſideration from the good ſenſe of the privy council, in the year 1619-20, and the good advice which they gave to the commiſſioners, who were at that time appointed to act in this buſineſs, "to conſider *of the* "*outfall to ſea*, before they drew down the waters." I am happy to find, that, agreeable to this good ſenſe and good advice, which was founded in experience, led by ſcience, the propoſitions thrown out for conſideration by the corporation of the Bedford level ſtand thus in order:

"First, to obtain a ſufficient outfall to ſea near "Lynn, by ſuch method as was formerly propoſed "by Mr. Kinderley, or by ſuch other means as "ſhall be judged more adviſeable by able en-"gineers."

Without firſt obtaining this outfall to ſea, that is, to deep water, every work will be but a temporary deception; every expence thrown away. If the value of the third acre, given up to the charge of draining, is expended, and has been found inſufficient; half of what remains, nay the whole, may be expended in the ſame effortleſs attempts; and finally, the ſtate both of drainage and navigation be rendered worſe, perhaps, remedileſs.

Let us conſider, therefore, firſt the actual ſtate and circumſtances of the outfall of Lynn Haven into the bay. It had two mouths, one by the eaſt channel, running under the lands of Woolverton, Shetſham, and Kitcham; the other, called the Weſt Channel, running on the ſide of Marſh land, with a ſhifting ſand lying betwixt them; the outfall chopped and changed from the one of theſe channels to the other, as the winds and tides ſhifted the ſands, and choaked up the one or the other channel: the tides and currents did, in the years 1772 and 1773, form a new channel, in a direct courſe with the channel of the haven, due north.

A remedy and cure, which no engineer would have hazarded his character in recommending, or would have ventured to have undertaken, Nature herſelf, by a fortunate criſis in the diſeaſe, has produced: here then, following and aiding Nature, we ſhould begin by ſuch works as will keep the courſe of the river's current with a ſtraight and ſcouring force, directly through this new channel; and if, upon an actual ſurvey and examination on the ſpot, it ſhould be found, that any thing could be done at the points marked in the chart *eaſt and weſt buoy*, ſo as to turn the firſt ſet of the tide, and to keep it in its flow, in a direct courſe up this ſame channel, that alſo ſhould be done. What the preciſe works ſhould or could be, will depend upon the nature of the ground which lies under the ſand, and upon the depth at which it lies.

The edging the channel of the haven with counter ſhores (ſuch as Lieutenant Page thought of for the interior channel of the wide baſin above Lynn) may be tried; but I have heard of other ideas, which, to me, ſeem more likely to ſucceed and to ſtand the teſt in practice.

Something, however, in the nature of a counterſhore ſhould be carried out along the haven, and, by degrees, to the mouth of the harbour at the forks; where the eaſt, north, and weſt channels divide, in order to maintain an interior channel, which may confine and direct the force of the currents at the outfall.

This interior channel (if it could be done at any practicable expence ſo as to be kept up) ſhould be cut open in a direct line, as near as the main river admits of, from the mouth of the new cut, through the haven, to the mouth of the harbour; and be kept in the middle of the main bed of the haven. The currents of the tide, when it hath riſen about half its height, and of the ebb upon the former part of its return, do now run over the ſands in an upper channel, which, below Lynn, holds its courſe toward the middle of the main bed: but the tide with its firſt bore, and the ebb with its ruſhing back-waters, ſet round to the weſt in a deep and narrow channel, cloſe under the perpendicular ſhores, ſo as to wear away the counter ſhore, to undermine the upper-works of the banks, and to have carried away the greateſt part of the town of Weſt Lynn, the church and great part of North Lynn. It ſtill doth and muſt, in this channel, continue to cut and wear away, with a force, which no art, at any practicable expence, has been, or ever will be able to reſiſt. It is now making the like havock in the haven as it has done above in the river, and is forming a wide baſin, which, as it forms, although at preſent it has a tolerable ſhip's channel, will be, in like manner as that baſin has been, choaked up with ſands. Let the engineers, who ſhall take the levels of the channel of the haven, mark the fact, whether there are not ſuch at preſent. As that operation takes effect, the courſe of the channel will grow more crooked and intricate, and the bottom of it uneven and obſtructed with high grounds. When all the waters, floods, and freſhes, no longer obſtructed and held up, are all brought down to paſs and draw through this haven as their ſewer; no expence "* which any law of ſewers can compel the land-"holders to;" no, not the whole value of the land (adjoiſting any particular lands to it as a private work) will be practicable to the reſiſting this operation, and its conſequence of deſtroying the haven. The haven, from the like cauſes which have produced the like effects, in the wide baſin in the river above Lynn, will be choaked with its own ruins, and loſt. It is juſt to ſay here, that I am afraid, the meaſure of opening a channel through the middle of the main bed of the haven, will be

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[*] Vide Dugdale.

ſcarcely practicable to any permanent effect. I do apprehend, from the nature of the bend of the river or haven round the town of Lynn, from the many reaſons why the bottom will be always higher next that town, from the current alſo of the ebb being thrown off by the lateral action of Sandringham Ea, and by the ſhip's forming a kind of jetty, that it will always ſwing round to the weſt, and that the interior channel will always continue to run under the weſtern ſhore.

The conſideration, therefore, for practice, is, how the currents of the river with its floods and freſhes, and of the tides with their bore are to be fended off, ſo that the lower banks of the interior channel may not be cut and worn away from under the main banks and their upper works.

The firſt principle of defence is, that while the engineer does, as he will (I have ſaid) be obliged to do, humour the determined unalterable courſe of the currents, he ſhould receive their force at an angle, as acute as poſſible, to be obtained by his works; and to ſhoot them off with an angle on the other hand, as obtuſe as poſſible; and that he ſhould do this with *a line of banking, of an uniform curve*, without ſuffering any irregularity of bend or elbow in it.

I will here venture to propoſe an idea, founded on this principle; and wiſh to ſubmit it to the ſcrutiny and examination of the beſt engineers we have, as to the ſcience; and to the moſt knowing of our country gentlemen, as to the practice and experience.

Firſt, a ſtrong pier, at the preſent Ferry Staith at Weſt Lynn, ſhould be run out, ſo as with its end to fall in with and continue in the ſame line the ſlope of the lower banks of the interior channel.

A like pier ſhould be run out juſt above the Old Ferry, at Dornale's Corner, ſo far as that its end may fall in with an uniform curve line, drawn from the lowermoſt weſt point of the new cut to the end of the pier at the preſent ferry; ſo as that ſuch a line of banking may be formed from the one to the other, as will receive at the moſt poſſible acute angle, and ſhoot off at the moſt poſſible obtuſe angle, the currents; and ſo as to give, as far as poſſible, a direction to the courſe of the tides, up into the new cut.

When it comes, in the next place, to be conſidered where, and in what form, *this curve line of banking* is to run, as it is, in ſome meaſure, determined by the two ends of the two piers, the only conſideration will be, Whether the banks ſhould be uniformly advanced forward, or whether they ſhould be advanced only in ſuch places as are neceſſary to the making and maintaining a continued face of banking in an uniform curve line. The curve, in the laſt caſe, will be greater, and the chief preſſure and bite of the current will act in the very ſpot where the banks are the weakeſt, the leaſt defenſible, and where it will coſt the moſt money to keep up this defence, even if it be poſſible; for in that very ſpot, between the two ferries, there is a line of bank, with a deep hole behind it; which therefore has nothing to ſupport it on the back; which, bank once broken, the waters muſt fall back to the high defenſible ground at ſome diſtance removed; the remaining part of the town of Weſt Lynn muſt go into the river; and the river will thus, in this place, become, at one ſtroke, a wide baſin, choaked up with the ruins of the havock which its current and tides have made. There will be a total end to all hopes of an uniform line of banking, of all ſcouring, of all drainage; and, in a ſhort time after, of navigation alſo. All this danger, however, may be avoided by filling up this hole. The doing this, although it is beyond the bounds of the abilities of the private landholder, will be as eaſy work as part of the general operation.

Wherever, and in whatever form of curve it ſhall be determined, that this line of banking is to run, it muſt be greatly ſtrengthened, both in its counter ſhores and upper works, in proportion now, as the greater quantity of waters with the leſs interrupted courſe, are brought down againſt them, and in the ſame proportion as the tides will now come in a more free and fuller flow.

From the pier, aforementioned, at the preſent Ferry Staith, to a point on the ſame weſt ſide of the haven whence the current of the river ſets off, to the eaſtward, and to which the tides, coming round from the eaſtward, ſet in, *a like uniform curving line of bank* ſhould be run and ſtrengthened. This will not be a matter of much expence, when once the lower banks and ſhores of the interior channel are ſecured; for moſt of the land here is high fenſible ground, and will beſt be defended with a long ſlope of flagged bank.

From below this point the current of the river runs under the eaſtern ſhore; and the whole puſh and ſtrength of the firſt tides in their entrance into the haven, ſet in upon that ſhore. On this eaſtern ſide, therefore, an uniform curve line of banking is neceſſary, and muſt be made. This ſhould, more than ordinarily, be ſecured by poſition and ſtrength. What that poſition ſhould be, (not being acquainted either with the particular nature of the ſet of the rivers and currents there, nor of the tides) I will not take upon me even to ſuggeſt.

The towns, whoſe common charge, the individuals, whoſe private charge, theſe banks now are, ſhould, to every juſt proportion that common juſtice and fair equality of law can demand, be rated by a quota, not adjoiſted by portions of work and pay their quota in ſuch proportion as the general rules of law, in theſe caſes, preſcribe, to the general expence of this as a common work.

If the country mean really to have a perfect work, ſuch as can preſerve the river and haven to the actual effect of drainage, and to the real purpoſes of navigation, it is by no means fit to leave the operation of this eſſential part of the work (could law force it) to the private adjoiſted work of theſe towns and theſe individuals, going no further than to an imperfect operation of ineffectual defence. To more than ſuch the whole value of their lands, adjoiſted to this part of the work, would not go; and no laws of ſewers, nor any other laws exiſting, can oblige the landholders to do all which muſt neceſſarily be done at the haven. If the country would have really a drainage, and a navigation by a perfect haven to a free and open outfall to ſea, *the operations to be done at the haven and its outfall in the harbour are, as of common intereſt, ſo to be done by all in common*, to that effect which every other work muſt primarily depend upon, and derive its operations from. That this ſhould be done at a common charge, as a general work, Wiſdom and Juſtice require—Wiſdom, as this never will nor can be done effectually, unleſs it be done under one common direction, by operations having reference to the whole—Juſtice, as the effect of the operation is what all receive benefit from.

As this haven * *hath been made* formerly, though it was not originally ſo in nature, and is now to be further made and kept up *as a ſewer* through which the great level and inland country drain off their waters; all who drain through it, ought in proportion as they profit by it, to pay towards it. This is an invariable law of ſewers, or rather a principle, on which all the laws of ſewers depend.

As this haven, thus kept up, is to be the port through which the navigation comes that ſupplies the inland country, all ought to pay toll towards its maintenance, in proportion as they are ſupplied by it.

It is an univerſal law of ſewers, according to the cuſtom of the realm, that no towns or individual landholders are obliged to keep up and maintain any ſewer of larger capacity, or with banks of greater ſtrength, than are neceſſary to the ſewing ſuch waters as of ancient time drained through them.

Wherever any new waters are permitted to be brought, by any new cut, through lands where they did not run of ancient time, thoſe who drain by that, are to make it and to keep it in repair: or, if any perſons are permitted to lead their waters (not ſo there before led) through any old drain of any other perſons; thoſe perſons, ſo profiting by the drain of their neighbours, are always to pay a certain rate towards it, ſo uſed; and in proportion as they profit by it, or as they can agree.

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* Vid. Dugdale.

See Dugdale, (Cole's Edit.) p. 153 and 163. See alſo p. 164, 165, 166, 275. It will there be ſeen, that the regulations made reſpecting Wainfleet-haven, in Lincolnſhire, were made under an invariable maxim of the law of ſewers, "That all who "drained through Wainfleet ſhould *cleanſe* and "*ſcour* and *dyke* the haven from Ea to Sea." See alſo p. 260.; where it is ſeen, that all who had benefit by the ſtream, as well thoſe who inhabited at a diſtance, as thoſe who lived near unto the banks, ſhould be diſtrained to the repair thereof. See alſo p. 278, where on a preſentment of a jury, thoſe towns even in Huntingdonſhire and Northamptonſhire, which were benefited by Clows-croſs drain, were preſented as being ſome of thoſe who were to be rated to the maintenance of it. See alſo p. 393, an Order of * the Privy Council, 1617, that a ſluice muſt be neceſſarily made at the outfall of Wiſbeach river into the ſea, at the charge *as well of the high countries as the low*, to be rated by the commiſſioners of ſewers. See alſo p. 398 —— There was a letter ſent from the Lords of the Privy Council, May 19, 1718, to the Commiſſioners, importing, "That by the reſult of that "Board, an order was made for a ſluice to be "erected at the outfall of Wiſbeach river; and "after that ſo done, the river to be ditched; "and that, ſince that time, without the conſent "of any of the commiſſioners within the hundred "of Wiſbeach, a law was made for the ditching "of the ſaid river (at the particular charge of "the ſame hundred) from Wiſbeach-bridge unto

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* Theſe matters, at that time, remained under the juriſdiction of that Board.

" the ſea; but no law for the ſluice: And moreover, that the ſaid river, when it was laſt " ditched, was enlarged from forty to ſixty feet " wide, *at the charge of the high lands and low* " *countries*; and that this law hath now impoſed " upon the ſaid hundred of Wiſbeach, the ditching thereof to its ancient breadth, making no " mention of the ſaid added twenty feet. All " which conſidered, the ſaid Lords think fit to " vary from ſome points of thoſe laws; and further ordered, that there ſhould be a ſluice made " at the Horſhoe, beneath Wiſbeach, *at the general charge* of all who drain that way: and that " from the Horſhoe to the Four-Goats, and as " far further as the Commiſſioners ſhall think fit, " the work to be done *at the general charge, and* " *not by the hundred of Wiſbeach*; in regard it is a " new work and beneficial to many countries: " as alſo that the river, from the Horſhoe to Guyhirn-croſs, be made ſixty feet wide, as it was at " the laſt time it was ditched, and at the general " charge; and all laws croſſing theſe orders to be " made void, and the orders *for making the outfalls* " *perfect*, be generally obſerved."

To ſum up the whole, If thoſe, who by right, intereſt and law are to conſider of this great buſineſs of drainage and navigation, will take it up as *one united inſeparable operation*; if they will begin firſt *at the natural outfall into ſea*, or deep water; if they will, as a firſt eſſential common work of this general meaſure, ſecure the outfall, " *and cleanſe and ſcour and dyke*" the haven of Lynn, both for the purpoſe of drainage as well as navigation, and will defend it as *a common work, to which all are to be rated in their due*

proportion,

proportion, both reſpecting private and common charge, but the work *to be done under one common direction, and at a common charge*—— if this be done, they will cut a new river, (as propoſed) which ſhall be really applicable to navigation and drainage, and will then redreſs the old river above, and will collect all the waters of the level into as few channels as poſſible, to be finally all united in the channel of the river Ouſe, and in the doing of this, will lay down and purſue, in fair, equal, and common juſtice, general ſettled rules, and not partial ones made on the ſpur of every occaſion; rating all and every individual to the charges, each in proportion as they receive benefit, or avoid miſchief: The great work, as a general work, will be found not only practicable, but eaſy of execution.

Experience (dear bought, God knows) has at laſt convinced all parties, that private and partial meaſures muſt always be ineffective, and finally ruinous to the country: The means to be taken, ſo far as they affect men and intereſts, are no longer ſo ill underſtood, as they uſed to be in ages of a narrower and more illiberal turn of mind: The mode of conducting the buſineſs, at its outſet, ſo as to ſettle the powers of thoſe who are to direct, and the proportions of thoſe who are to pay, are by general rules, now well underſtood, digeſted, and ſettled in Parliament. A kind of conſpiring ſimilarity of opinion, and a practical ſpirit of buſineſs, ſeem to form the preſent conjuncture, in which it may be done.

If the intereſts of drainage and navigation ſhall join in ſentiments, as they are united in operation; if the work ſhall be undertaken as one general intereſt, and conducted by one general direction, at one common charge; and ſhall begin from a natural outfall to ſea, that is, deep water; the inland country will be drained, Lynn will be maintained a great maritime town, and there will be, through a moſt extenſive part of England, an Inland Navigation.

F I N I S.

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